DOCUMENT RESUME

ED 084 242 SP 007 477

AUTHOR Collea, Francis P.
TITLE A Model for the Pre-Service Training of Science Teachers Based on the Intentions and Perceptions of First Year Science Teachers.
PUB DATE [68]
NOTE 11p

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS Affective Objectives; *Beginning Teachers; Cognitive Objectives; *Educational Programs; *Inservice Education; *Preservice Education; *Science Teachers; Training Objectives

ABSTRACT

This preservice and in-service training model for science teachers is based on the perceptual and behavioral changes experienced by first-year science teachers. The objective of this model is to develop science teachers with strong scientific backgrounds who can relate course content and affective understanding to students. The model is divided into phases: a) a cognitive phase which is emphasized in the preservice training pogram and b) an affective phase which is focused upon in the in-service training program. The cognitive phase includes the acquisition of skills and concepts and the understanding of content material which lead to effective student learning. The affective phase, which begins during the first year of teaching and lasts for three years, is designed by local school districts to meet the immediate needs of beginning teachers. This phase may focus on group process skills, decision making, control, management, or problems dealing with consensus. (BRB)

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A MODEL FOR THE PRE-SERVICE TRAINING OF SCIENCE TEACHERS BASED ON THE INTENTIONS AND PERCEPTIONS OF FIRST YEAR SCIENCE TEACHERS

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Submitted By: Dr. Francis P. Collea
Assistant Professor of Science Education
Department of Science and Mathematics Education
California State College, Fullerton

SP 007 477

BACKGROUND

The first year of teaching is a critical one for most teachers. The adjustments to the demands and realities of the situation are sometimes dramatic, even traumatic, for most beginning science teachers. Druger (1968) expressed concern about the "reality gap" between teacher preparation in the colleges and what is actually encountered during the first year of teaching. This lack of preparation for the "real world" was also reported by Schneiweiss and David (1967) as an outcome of a meeting of some first year science teachers in New York state. The results are often frustration, discouragement, and eventual loss of a potentially good teacher from the profession.

Despite the importance of the first year of teaching, relatively little research has been done concerning the first year science teacher. In order to effectively evaluate and revise present teacher preparation programs, objective information about relevant first year teacher attributes is needed. An important set of factors to study is the intentions, role-perceptions and self-perceptions of the first year teachers. The following assumptions underlay the reasons for examining these factors:

1. What a first year science teacher does in the classroom is in part related to what he intends to do (behavior related to intentions).

2. What a first year science teacher intends to do in the classroom is in part related to his perceptions of what others want him to do (behavior related to role perceptions).

3. What a first year science teacher intends to do in the classroom is in part related to his perceptions of what he is actually doing (behavior related to self-perceptions).

During pre-service training, the new teacher may have developed an idealized picture of his role in the classroom. Does the first year science teacher actually teach in accordance with his perceptions of role and self? Do his perceptions of role and self change during the first year of teaching? Does he move closer to the "ideal teacher" as perceived by his principal and science supervisor? Is his verbal behavior in the classroom consistent with his perceived behavior? This writer conducted a two-year study to answer these questions by carefully monitoring the intentions, perceptions, and classroom verbal behavior of first year science teachers. The results of that study were as follows:

1. The intentions (the way a teacher would like to teach) of first year science teachers were in conflict. Beginning science teachers increased their desire to motivate students, and yet, they decreased in their desire for student participation in classroom activities. While increasing their intentions to justify their authority in the classroom, these teachers also increased in the desire to use more indirect behavior in the classroom. It appears that the first year science teacher is caught in a role conflict. That is he expresses a desire to identify and develop rapport with students, but at the same time he is trying to establish authority and discipline in his professional role as a teacher. Similar results were

reported in studies conducted by Walberg (1964) and Stern (1963).

2. The role perceptions of first year science teachers were also in conflict. These teachers felt their principals wanted them to encourage and praise students more, but at the same time to use more criticism to justify their authority in the classroom.

3. By the end of the school year, not only did first year science teachers perceive themselves as being more direct, but actual observations of their classroom behavior indicated they were more direct. At the end of the school year, these teachers perceived themselves as motivating students less and having less student participation than they had at the beginning of the school year.

4. Most of the science teachers in this study felt they had more than enough subject matter preparation. Their problem was in the transition from the level of college science courses to the level of science courses taught at the secondary school level.

5. These teachers reported that they lacked the time during the busy first year of teaching to obtain, digest, and implement all the source materials and ideas that were available.

6. First year science teachers indicated they had difficulty developing lessons that were meaningful to students of different ability levels.

This study gives an objective measure to the perceptual and behavioral changes that a science teac her undergoes during his first year of teaching. In addition, it discusses other problems the new teacher faces in the classroom. These results can be used as a method of assessing the effectiveness of teacher preparation programs in influencing the verbal behavior patterns of first year science teachers.

THE MODEL

Based on the results of this study the following model is presented to help first year science teachers overcome some of the problems of "reality shock" encountered during the first year of teaching. The model has two parts: a cognitive phase and an affective phase. The cognitive phase is the major thrust of the pre-service training of the science teacher. It includes the acquisition of skills, concepts, and understandings of content material which lead to effective student learning. The affective thrust is the primary concern of the in-service training program. It begins during the first year of actual teaching and continues on for the next three years of the new science teacher's career. This phase would be designed by local school districts to meet the immediate needs of their beginning teachers. The program might focus on group process skills, decision-making, control, management, or problems dealing with consensus.

PRE-SERVICE PHASE

During pre-service training, techniques must be developed to help prospective teachers unsophisticate the material that they were taught in their college science courses and present this content in terms that the secondary school science student can fully understand. To accomplish this, there must be a complete revision of the content courses in the undergraduate curriculum of the prospective science teacher. This could be accomplished in the following manner: the college science program would begin with very specialized courses in the student's particular science content area. During the senior year, this program would be completed by a general course in physics, chemistry, or biology. It is assumed that this senior level course, although general in nature, would be on a much higher level than present freshman courses. This course would be so designed to include the unified processes inherent in that particular discipline. For example, a prospective science teacher could be a physics major for three years, taking very specialized courses in physics. During his senior year, he would take the senior level general physics course that would allow him to draw on previous specialized training. It would be flexible and utilize individual instruction, small group instruction, and large group instruction. Each pattern of instruction would deal with topics, problems, and competencies in an inter-disciplinary fashion. The integrated and unified structure inherent in such a course would provide greater ease in the transition to teaching subject matter at the secondary school level. This general course would place greater emphasis upon the "how we know" along with the "what we know" of subject matter.

The course would form the basis for the introduction to the inquiry approach to teaching science. It could be taught by a team of instructors with individualized strengths and a willingness and ability to plan and work together. These teachers would sometimes teach individually and sometimes teach together. Frontiers of research could be explored with provisions for laboratory experiences that are open-ended and which lead to discovery.

This pre-service experience would involve the prospective teacher in a variety of activities that would take place in a high school setting. He would begin by observing the teaching styles of many teachers in actual classroom situations. He would also observe students who were at different ability levels in learning situations. Hopefully, this will afford him the opportunity to view all possible kinds of students he will encounter when he becomes a teacher. They would serve as teacher aides, laboratory assistants, and tutors in high school classes. These experiences would begin as the student decides he wants to pursue an undergraduate teaching program.

Teachers and students would act as consultants to the prospective teachers. The field experiences are tied integrally to the overall instructional program. Therefore the student would be exposed to a range of skills extending beyond those of his team of college instructors.

Finally this pre-service phase would require these students to prepare lessons for each of the ability groups observed in the schools,

and then teach these lessons to those students. This allows the student to act as an instructor during a sequence of instruction. It allows the prospective science teacher to use and become familiar with a wide variety of resources, and gives him the opportunity to put these materials to work in a real situation.

This model places all pre-service emphasis on subject matter preparation coupled with effective field experiences.

IN-SERVICE PHASE

The in-service phase of the model would shift the location and responsibility for training new teachers from the college to local school districts. The following reasons are given for this shift:

1. Present college programs have serious deficiencies. In many cases they are physically too far removed from high schools. Their programs have not focused on the needs and concerns of prospective teachers. They have not developed feedback systems which enable them to assess the character and quality of their program.

2. School districts in the past have not played an active role in the training of teachers. Although many college-based teacher training programs have shifted to local school districts in recent years, the training responsibility has been controlled by the colleges. These school districts have failed to act in their own best interests and have relied heavily on the colleges to do all their teacher training for them.

In other words, school-based and controlled teacher preparation programs, as compared with college based programs, have a higher probability of being flexible, integrated, and more closely related to the needs of new teachers. Since it can be designed to meet the concerns of beginning teachers, it has a greater chance of solving some of the problems these teachers face.

The focus of this in-service phase allows the first year science teacher to explore such issues as leadership, affection, control, decision-making, and consistency in classroom situations. During this period the intentions, perceptions, and verbal behaviors of first year science teachers can be examined and analyzed. Feedback systems could be developed to allow the new teacher to bec ome more aware of himself and his effectiveress as a teacher. Various teaching strategies would be developed and ways of introducing them in the classroom would be devised.

This affective phase would be conducted in small groups. It would be made up of experienced teachers, beginning teachers, principals, and district staff personnel. In addition, consultant services from various colleges could be obtained on an as needed basis. Since all levels of the school community are involved, it offers the possibility of setting up a positive atmosphere into which first year teachers can place their problems and concerns and have them dealt with in a supportive manner. Hopefully, all will be actively involved, there is a high probability that all members will maintain open and meaningful communication links. From these sessions, the first year teacher will be able to overcome some of the role conflicts he faces during the beginning years of his teaching career.

The intent of this model is to develop science teachers with strong scientific backgrounds that can effectively relate this content to high school students, but at the same time maintain a strong affective flavor. It requires a large commitment from school districts to become actively involved in the training of their teachers. It is honed that a balance between knowing and feeling on the part of the new teacher will enhance his effectiveness in the classroom.

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